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DEVOTED TO THE INTERESTS OF
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ÆSTIVATION OF EPIPHRAGMOPHORA TRASKII IN SOUTHERN CALIFORNIA.

BY MRS. M. BURTON WILLIAMSON.

When the frost is on the ground and autumn leaves lie scattered over orchards and forests, it is no surprise to find that land snails (*Helices*) have begun their period of hibernation, and lie sheltered under the layers of dead leaves or hidden in decaying trunks of trees. The annual sleep of the snail in winter corresponds well with the enforced rest of the vegetable world; but in a tropical or semi-tropical climate the atmospheric conditions are different, and in place of a winter rest, snails take their annual sleep in summer. The hibernation of snails in colder countries is reversed, and in its stead æstivation of snails is the result. In the eastern states *helices* take their annual siesta in winter, but in southern California snails differ from their congeners, presenting an illustration of the power of environment in modifying instincts. Instead of going into winter quarters in October and remaining from four to six months without food and motionless, the greatest activity of the southern California *Helix* is during the winter months. The reason for this is that the food supply is plentiful in the winter when the warm rains prevail; and during the summer months the arid condition of the foot-hills, the habitat of these quiet creatures, made the æstivation of snails a necessity, a question of economy, an adjustment of demand and supply. In process of time the necessity for æstivation rather than hibernation became a habit.

When snails require rest in southern California they attach themselves to the under surface of dead cacti, pieces of wood, stones, or

burrow in the soil; in every case the aperture of the shell is upward, with the apex below. With its mucus the *Helix* securely glues this aperture to the under surface of any substance to which it attaches itself. These land snails, being non-operculated pulmonates, their apertures are covered by an epiphragm. (In experimenting on a number of *Helix tudiculata* and *Helix traski*, my experience has been that if the epiphragm has been badly punctured, or broken, the snail will die unless circulation is started by applying moisture.) This covering is composed of several layers of hardened mucus which resembles the tough white skin that lines a hen's egg.

In experimenting with helices in a snailery, a wooden box covered with a wire screen and partly filled with soil, I have found that while one species of snail (*Epiphragmophora traskii* Newc.) would fasten themselves to the strip of wood that braced the lid of the snailery, the other species (*Glyptostoma newberryanum* W. G. B.) would burrow in the soil, their black shells almost hidden from sight. In order to test them I have repeatedly interrupted their æstivation by placing their shells in luke-warm water until the helices could crawl about, but they would eventually be found in separate places, *E. traski* suspended above and *G. newberryanum* below in the soil.

During æstivation the snail's functions are in a state of coma, respiration is nearly suspended, and having retired as far as possible within the shell the mollusk is the embodiment of rest. Its waking is not a voluntary action. Without humidity the snail will æstivate for months and continue in a state of torpor for years if the atmosphere is dry around it. Conchologists frequently quote the example given by Dr. R. E. C. Stearns, of the U. S. National Museum, of a Lower Californian *Helix* that rested, or rather remained in a state of torpor for six years! Other cases of prolonged relaxation of the vital functions of snails are recorded.

Some years ago, in March, 1890, I collected a few land snails (*E. traski* Newc.) from some of the low foot-hills in Los Angeles, and on reaching home, finding them glued to the glass jar, they were left on a stand. In the morning two snails had crawled out of the jar and up the wall and were snugly ensconced in one corner of the ceiling, another one had traveled far in the night and had pre-empted his claim in one corner of the hall ceiling. In order to study developments they were allowed to remain *in situ*. One soon fell down upon the carpet but the other two remained intact. The

household orders were that the helices were to be left undisturbed by brush or broom. The summer came and went, autumn followed, winter came on and still our hermaphrodites "held the fort." No sound of mirth nor music aroused them.

But the rains came on, heavy drenching showers that rushed down the mountains, washed the foot-hills, overflowed the ozanjas, and all nature was in a dripping condition. During one of these storms in January, 1891, the rain came down with such force that it made invidious incursions into the hall during the night, and the snail was found on the floor. In an hour it was as willing as ever to struggle for existence. It ate heartily of celery with its little rasping tongue (radula) beset with multitudes of tiny siliceous teeth.

It was not until February 23 that the other *Helix* had been sufficiently overcome by the forces of nature to loosen its epiphragm enough to descend to the floor. It was placed in a shallow saucer of water, and it assumed its functions as though they had not been arrested.

While these house snails were glued to the ceilings, their relatives in the snailery in the garden had been aroused to activity by the first rain as it pattered through the screen cover; and on January 2, 1891, I found a number of tiny pellucid-looking balls carefully hidden in the moist earth in the snailery. These were the eggs of the snails. In less than three weeks there were young snails. Time had been lost by the house snails, their æstivation extending beyond the requirements of nature had gained them nothing.

It was my intention to study all these forms, and while giving a rest to the "house snails," compare their longevity with the garden helices. But, alas, for the rapacity of the animal kingdom, sowbugs, ants and insects from the rose bushes made war upon the whole snail colony, adults, babies and eggs, and by summer time the houses were empty, the tenants were gone!

A NEW SPECIES OF LIMA.

BY W. H. DALL.

Recent excavations involved in the construction of a tunnel through a hill at Los Angeles, California, on the line of Third street, have developed the presence of fossils, probably Pliocene, in the blue clay through which the tunnel is being cut.

Several specimens, more or less crushed, of a large *Lima* are among the forms collected. This species belongs to the general type of *Lima excavata* Fabr., *L. goliath* Sby, etc., and reaches to a length of four and a half inches. The valves are brilliantly polished, and in the middle part unsculptured, the anterior and posterior thirds are finely radially grooved with shallow grooves of which the outer slopes are less steep than the inner; the incremental lines, obsolete elsewhere, appear in the channel of the grooves and cross striate it here and there, giving the effect of obsolete punctation. I may add that close to the impressed area of the shell there are two or three coarser, deeper radial grooves. The species differs from the South Pacific and all other forms of its group known to me in its much finer and more delicate sculpture and brilliant polish. I await more perfect specimens before trying to figure it, but would propose the name of *Lima Hamlini* for the species in honor of Mr. Homer Hamlin C. E., Asst. City Engineer of Los Angeles, who is much interested in the geology and paleontology of the region, and has made valuable studies of the southern California Tertiary. The specimen in hand was kindly forwarded for examination by Dr. R. E. C. Stearns.

A REVISION OF THE PHYSAE OF NORTHEASTERN ILLINOIS.

BY FRANK C. BAKER.

While working up the fresh-water mollusks of the Chicago area for a report on the Mollusca, the genus *Physa* came up for consideration, and the chaotic condition of the group, judging by the conflicting opinions of conchologists, seemed to warrant a somewhat critical revision of the species found in northeastern Illinois, and incidentally of northern Illinois. The best-known species, *heterostrophæ*, is little understood, and seems to be more frequently confounded with *gyrina* than with any other form, excepting, perhaps, *integra*.

A large collection of Physidæ, from different parts of the United States as well as from northern Illinois, has been examined, and the writer believes that all of the species found within the area have been elucidated. It is very probable that there are but ten or fifteen valid species of *Physa* in the United States, six or seven of which are to be found in the northern part of this region east of the Rocky Mountains.

During a visit to the Philadelphia Academy of Sciences some time ago, Mr. Pilsbry called the writer's attention to the fact that *heterostropha* had a smooth shell, while *gyrina* and some others had a shell with impressed spiral lines. Following up this suggestion a large number of *Physæ* have been examined, with the result that instead of there being two species in northern Illinois, there are at least four species and one variety.

The following notes have been made from fully adult specimens, and the figures are outline drawings of photographs, and are therefore accurate.

Key to Northern Illinois Physæ.

- A. Shell smooth, broad, spire short. *heterostropha.*
- B. Shell with impressed spiral lines.
 - a. Shell rather broad, ovate, spire short, acute; aperture wide and spreading; whorl $4\frac{1}{2}$ -5; shell thinner than b and c; peristome callus bordered by red. *sayii.*
 - b. Shell elongated or cylindrical, narrow, spire generally long; aperture every narrow; whorl 5-6; peristome callus bordered by red. *gyrina.*
 - c. Shell broad, inclining to be shouldered; spire sharply conic; aperture roundly oval; whorls $4\frac{1}{2}$ -5; peristome callus white without red border. *integra.*

***Physa heterostropha* Say. Fig. 1.**

Limnæ heterostropha SAY, Nich. Encycl., Amer. ed., pl. 1, fig. 6, 1817. *Physa fontana* HALDEMAN, Mon. pt. 2, p. 3 of cover; *Physa*, p. 26, 1841.

Shell polished, subovate; whorls $4-4\frac{1}{2}$; spire moderately elevated, acute, the whorls slightly convex; color varying from light horn to greenish; sculpture consisting only of fine growth lines; sutures impressed, margined by a white line which is frequently bordered by a dark chestnut line; protoconch consisting of one whorl, which is smooth, and varies from porcelain-white to rather dark horn color; aperture rather large, oval, occupying from two-thirds to three-quarters of the length of the entire shell; peristome thin, acute, thickened on the inside by a whitish or bluish callus, which is bordered on the inside with red; columella almost straight, with a whitish callus which is sometimes lined with red.

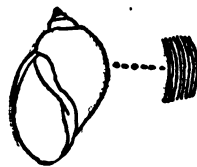


FIG. 1.

Length 14.00; width 8.50; aperture length 10.00; width 4.00 mill. (Rochester, N. Y.)

Length 13.00; width 8.50; aperture length 10.00; width 4.50 mill. (Rochester, N. Y.)

Length 13.50; width 9.00; aperture length 10.50; width 4.50 mill. (La Porte, Ind.)

Length 9.00; width 6.00; aperture length 6.50; width 3.00 mill. (Chicago.)

Animal similar to that of *gyrina*. Jaw and radula in all respects like those of *gyrina*. Distribution: eastern and southern states from Maine to Georgia and west to Michigan and Illinois; Southern Canada. Geological distribution: Pleistocene; Loess. Habitat: in ponds and streams, adhering to sticks and stones, and crawling over the muddy bottom.

Only a single lot of shells has been found which could be referred to this species and that was collected in the drift along the shore of Lake Michigan at Miller's, Indiana. The nearest typical *heterostropha* have been found living in Pine Lake, La Porte Co., Indiana. It is very probable that this species is not found in any abundance west of Indiana, its place being taken by *gyrina*, *sayii* and *integra*. Under distribution above, only those states are given from which the writer has seen authentic specimens.

***Physa Sayii* Tappan. Fig. 2.**

Physa sayii TAPPAN, Amer. Journ. Sci. (1), vol. xxxv, p. 369, pl. iii, fig. 3, 1839. *Physa warreniana* LEA, Proc. Phil. Acad. Sci., p. 115, 1864.

Shell polished, ovate, whorl $5-5\frac{1}{2}$; spire elevated, very acute, the whorls moderately convex; color light horn to light chestnut; sculpture consisting of rather coarse growth lines, crossed by numerous fine, impressed spiral lines, giving the surface of the shell rather a wavy appearance, as figured for *gyrina*; sutures slightly impressed, bordered as in *heterostropha*; protoconch consisting of one and a half

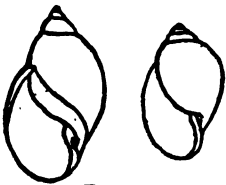


FIG. 2.

smooth, glossy whorls of a dark chestnut color; aperture very large, long oval, three-fourths to four-fifths the length of the whole shell; peristome thin, generally not much thickened within, whitish sometimes bordered with reddish; columella slightly twisted and cov-

ered with a spreading callus; the lower part of the aperture is somewhat produced.

Length 22.00; width 13.50; aperture length 16.00; width 7.50 mill. (Chicago.)

Length 19.00; width 12.00; aperture length 14.00; width 6.00 mill. (Chicago.)

Length 16.00; width 11.00; aperture length 12.00; width 6.00 mill. (Chicago.)

Animal similar in external appearance to all *Physidæ*. Jaw and radula as in *gyrina*. Distribution: Ohio, Indiana, Michigan, Illinois, Missouri. Geological distribution: Pleistocene; Loess. Habitat: In stations similar to *heterostropha* and *gyrina*.

Remarks: This species was at first identical as *ancillaria* Say, but that species, while having the same surface sculpture as *sayii*, is more inflated, the outer lip more spreading and the body whorl more gibbous, the spire being always much shorter and the whorls more convex. The surface sculpture is very beautiful and precisely as described for *gyrina*. This species is not common, and has been found at Joliet, Maywood, Lake Calumet and Lake Michigan near the foot of Oak Street. *Sayii* is apparently closely related to *ampullacea* Gould, a Pacific coast species.

***Physa gyrina* Say.** Fig. 3.

Physa gyrina SAY, Journ. Acad. Nat. Sci. Phil., vol. 2, p. 171, 1821. *Physa striata* MENKE, Syn. Math., ed. 2, p. 32, 1830. *Physa hildrethiana* LEA, Proc. Amer. Phil. Soc., vol. 2, p. 32, 1841. *Physa cylindrica* NEWCOMB, in DeKay, N. Y. Moll., p. 77, pl. V, fig. 82, 1843. *Physa plicata* DEKAY, l. c., p. 78, pl. V, fig. 85, 1843. *Physa saffordii* LEA, Proc. Phil. Acad. Sci., p. 115, 1864. *Physa hawnii* LEA, l. c., p. 115, 1864. *Physa parva* LEA, l. c., p. 115, 1864.

Shell elongated, generally polished, whorls 5-6; spire always very long (as compared with the last two species), acute, the whorls in some cases almost flat, and at best but slightly convex, color varying between light-greenish horn and brick-red; sculpture consisting of well-marked growth lines, crossed by numerous fine impressed spiral lines, giving the shell a wrinkled appearance (see figure of sculpture); these lines appear at first to be raised, but when viewed through the microscope are seen to be impressed between two wrinkled ridges, as seen in the cut; sutures scarcely impressed, but

bordered by a porcelain-white line which is rarely edged with chestnut; aperture rather long, long-oval in form, much narrowed at the upper part, more than a half and less than two-thirds the length of

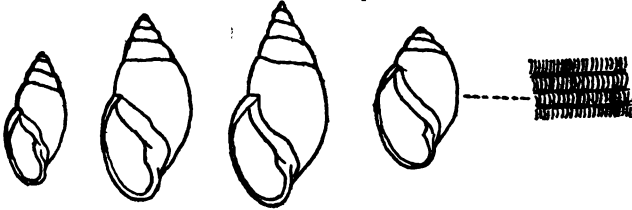


FIG. 3.

the entire shell; peristome thin, thickened within by a callus which is either bordered by a dark chestnut band or else is itself of that color; columella thickened with a decided white callus or plait; the lower part of the aperture is produced; the periods of winter hibernation are frequently marked by a whitish band in the body of the shell; protoconch consisting of a trifle more than one smooth, rounded, dark chestnut-colored whorl.

Length 17.00; width 9.00; aperture length 11.00; width 4.50 mill. (Chicago.)

Length 26.00; width 12.00; aperture length 14.00; width 5.50 mill. (Chicago.)

Length 24.00; width 11.50; aperture length 13.00; width 5.50 mill. (Chicago.)

Length 19.00; width 10.00; aperture length 12.00; width 5.00 mill. (Chicago.)

Length 22.00; width 10.00; aperture length 12.50; width 5.00 mill. (Chicago.)

Animal with a long and rather narrow foot, acutely pointed behind and rounded before, where it is produced into lateral lobes; the foot does not extend much beyond the edge of the shell; color blackish or yellowish gray, dotted or flecked with whitish or yellowish, the dots being distinctly seen through the transparent shell; the front of the head is ornamented by two yellowish spots of good size, composed of numerous minute dots; the mantle is brown, spotted with yellowish, is reflected over a portion of the shell on the right side, and produced into four filiform digitations; tentacles very long and slender, tapering to a point; head distinct, separated from

the foot by a short neck; mouth large, in the lower plane of the head, showing plainly the jaw and radula while the animal is grazing along the side of an aquarium; eyes placed on swellings at the inner base of the tentacles; respiratory cavity on left side of the shell at the lower point where the peristome meets the body whorl. Length of



FIG. 4.

foot 15.00; width 4 mill. extended (Fig. 4).

Jaw in one piece, arched, striated, provided with a central fibrous projection from the superior surface; ends rounded (Fig. 5, J).



FIG. 5.

Radula: Formula $\frac{95}{13} + \frac{95}{1} + \frac{1}{2.5-2} + \frac{95}{1} + \frac{95}{13}$ (190-1-190); central

tooth more or less quadrate, the lower outer corners being very much attenuated; cusp 9-dentate, 5 denticles being long and narrow, and two on each side smaller and more blunt; laterals in two alternate series, the primary teeth large, obliquely inclined, comb-like; the cusps are very peculiar, and vary to a large degree; some teeth have five long, pointed cusps with six small ones, one between each large one and one at each end (Fig. 5); others have but two small denticles, while still others have one or more between (Figs. 5, 2, 3, 4). The secondary teeth are long and narrow, with a wide, blunt cusp. These latter, as also the central tooth and small teeth between the cusps of the primary teeth, are very difficult to observe (Fig. 5).

Distribution: Probably inhabits the whole of the northern and central parts of the United States and Southern Canada. Geological distribution: Pleistocene; Loess. Habitat: Found very abund-

antly in ponds and streams of greater or lesser size, adhering to sticks or stones, and crawling over the muddy bottom. Inhabits either running water or stagnant pools.

Remarks: This is a very common and handsome species. Its habits are active, moving with a rapid, steady, gliding motion. It is very interesting to watch a number of *Physæ* in an aquarium; as they are crawling along the bottom, one will be seen to rise suddenly to the top of the water and move along with the foot applied to the surface, the shell hanging down. Again, they may be seen descending, suspended by a thin thread of mucus. When the animal rises suddenly, the branchial cavity opens with a faint clicking sound, probably due to the pressure of air in the lung. This species frequently inhabits water as cold as the freezing point, and may be observed in winter gliding along the bottom of a pond when the surface is frozen. The eggs are deposited on stones, the under side of sticks, etc., and are composed of large, glairy, transparent masses.

Several *Physæ* kept in captivity laid four egg masses on April 23, 1897. The egg masses measured 20 by 4 mill., and contained from 120 to 200 eggs. On April 24, ten additional egg masses were laid. The jar contained 15 individuals. On June 3, in the afternoon, the writer noticed a number of young in a jar containing egg masses deposited probably in the latter part of April. The young were half a mill. in length, vitreous in appearance and perfectly transparent. They were very lively, crawling about the jar and feeding voraciously upon the scum found on the sides of the glass. The heart pulsated 120 times per minute. On June 15th the young had increased to one mill. in length. About a week later, unfortunately, the whole lot died, so that no further notes could be taken.

Physa gyrina is by far the most common species of the genus (I might say of any genus) found in the area, and has been found in all parts of northern Illinois. It was at first confused with *heterostrophæ*, but that species has a smooth shell (see above) and is not found in any numbers in the area; it is very probable that *heterostrophæ* is not found west of the Mississippi River, and the quotations of this species from western localities were probably founded on *gyrina*, *sayii*, *gabbi*, *integra*, etc. This species is very variable in this region, some forms approaching *ampullacea* Gould, while others might be taken for *gabbi* Tryon, or *virginea* Gould, so far as form goes. It is probable that some west coast names will be added to the above synonymy, when more study is given to this genus.

***Physa gyrina elliptica* Lea. Fig. 6.**

Physa elliptica LEA, Trans. Amer. Phil. Soc., vol. V, p. 115, pl. xix, fig. 83, 1837. *Physa aurea* LEA, l.c., vol. VI, p. 18, pl. xxiii, fig. 106, 1839. *Physa troostiana* LEA, Proc. Am. Phil. Soc., vol. II, p. 32, 1841. *Physa nicklinii* LEA, Proc. Phil. Acad. Sci., p. 114, 1864. *Physa altonensis* LEA, l.c., p. 114, 1864. *Physa feligerii* LEA, l.c., p. 114, 1864. *Physa oleacea* TRYON, Amer. Journ. Conch., vol. II, p. 6, pl. ii, fig. 6, 1866.

Shell differing from typical *gyrina* in being more elliptical, having a shorter, more rounded spire, and hence more convex whorls, the spire, as described by Tryon, "with the outline not elevated above a continuation of the general curve of the body." The shell is also more solid and the outer lip thicker with a very heavy,

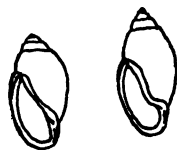


FIG. 6.

bluish-white callus. The surface sculpture is the same as in *gyrina*.

Length 15.00; width 7.50; aperture length 9.50; width 3.50 mill.

Length 11.00; width 6.00; aperture length 7.00; width 2.50 mill.

Length 12.00; width 7.50; aperture length 9.00; width 3.75 mill.

Animal, jaw, and radula, as in *gyrina*. Distribution: evidently the same as *gyrina*. Geological distribution: Pleistocene; Loess. Habitat: Almost always associated with *gyrina*.

Remarks: The typical form of this variety seems at first quite distinct from *gyrina*, but in a multitude of forms (the writer has examined several thousand specimens) is seen to fade imperceptibly into the typical form. From observations in the present area, *gyrina* would seem to be dimorphic, consisting of the typical *gyrina* with long spire, and the variety *elliptica* with short, dome-shaped spire. This belief is strengthened by the fact that the two forms are always associated together. It is not quite as common as the typical form.

***Physa integra* Haldeman. Fig. 7.**

Physa integra HALDEMAN, Mon. p. 33, pl. IV, fig. 7, 8, 1841.

Physa niagarensis LEA, Proc. Phil. Acad. Sci., p. 114, 1864.

Shell oval, whorls $4\frac{1}{2}$ –5; spire short, pointed, the whole convex; sutures well marked, sometimes banded by a faint white line; color varying from light yellowish horn to pale brown; sculpture as in *gyrina*, the lines being very deep and the wrinkled edges very convex; protoconch consisting of one and a half smooth, rounded, wine-colored whorls; aperture oval, rather wide, produced at the

anterior end, about two-thirds the length of the entire shell; peristome thin, thickened within the aperture by a heavy white or yellowish callus, which shows through the shell very plainly; it is never bordered by any color stripe; the callus of two or three former peristomes may always be seen on the body whorl and sometimes one or two on the spire; columella

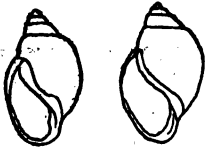


FIG. 7.

broad, flat, white, a callus spreading over the parietal wall.

Length 12.00; width 8.00; aperture length 7.50; width 3.00 mill.

Length 10.50; width 7.50; aperture length 7.50; width 3.50 mill.

Length 10.00; width 6.00; aperture length 5.50; width 3.00 mill.

Animal not differing essentially from *gyrina*. Jaw similar to that of *gyrina*. Radula similar in form to that of *gyrina*, but differing in having six large, nearly equal cusps, instead of five, in the absence, generally, of small cusps between the larger ones, and in the reflection being wider than in *gyrina* or *heterostropha*. The radula of this species is remarkably uniform in the form of the teeth and in the number of the cusps. The central tooth and secondary teeth appeared to be the same as in the species previously described.

Distribution: Great Lakes and St. Lawrence River, New York, Indiana, Illinois, Tennessee, Michigan, Wisconsin. Found in great abundance in Allen's Creek, near Rochester, New York. Geological distribution: Pleistocene; Loess. Habitat: At stations similar to *gyrina*.

Remarks: This species has been generally confounded with *heterostropha*, but will at once be separated from that species by the spiral lines; the general form also is different from any other shell found in this area, and the white callus on the lip is peculiar. It is a common shell at Hickory Creek, Lockport and Joliet, and has been found, though more sparingly, at Calumet Grove, Maywood and at Edgewater. It is more common than *sayii*, but less so than *gyrina*. The specimens from Hickory Creek are quite typical, resembling closely Haldeman's figures (pl. 4, figs. 7, 8) in his monograph of fresh water mollusca.

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Vol. XIV.

^A JULY, 1900.

No. 3

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IN SEARCH OF POLYGYRA PILSBRYI.

BY JAS. H. FERRISS.

In the month of February, both in 1899 and 1900, I made trips to Arkansas for health and shells, and on both occasions stopped at Hardy, Sharp county, Ark., on Spring River, which heads at the famous Mammoth Springs, in Missouri. This part of America at some time was plainly lifted by an enormous upheaval, and the limestone came down without regard to good order. The highest points are probably 1000 feet above the sea.

Spring river is a beautiful stream. The water so pure and deep is of a Nile green in color, but in every half mile or so at this point there is a natural dam, covered with fine unios and "periwinkles." When Messrs. Sterki and Simpson have helped me over the hard places, a list of these will be given. I found this year one new Unio anyhow.

Half of one day this year was given to Little Rock, where good collecting is to be found in a rocky bluff near the Iron Mountain bridge.

Upon both trips I jumped to DeKalb, Bowie county, Texas. Last year I went with a party of turkey hunters as far as Little River, in the Choctaw Nation, all in the low lands, then by rail to Tuhskahoma and Poteau, on the Frisco road—another blown-up limestone country. In this part of the Indian nation the road passes between two mountain ranges. It is the prettiest of landscapes, and I am sure in the month of May the snails swarm out of the damp corners and fern-clothed rocks in great numbers to view the scenery. Judging by the government maps of near-by territory, these mountains are about

1,000 or 1,500 feet above the sea. From Poteau, Sugarloaf, a dozen miles away, could be seen, and this knob runs up to 2,000 feet; but a cold wave drove me home before I could make this mountain a visit.

In three days, at Poteau and Tushkahoma I found *Polygyra Binneyana* Pils., *Poly. divesta indianorum* Pils., *Poly. dorfeuilliana percostata* Pils. and *Gastrodonta demissa lamellata* Pils. These places are about 80 and 40 miles east of Limestone Gap, where Simpson found *Poly. kiowaensis*; 50 miles west of Mena, and Mena is 70 west of Hot Springs, where *Poly. kiowaensis arkansensis* Pils. was found. I never saw either, and I hunted hard.

But in the winter many shells surely could not be found. It was next to impossible to find a mature *Omphalina friabilis* or a *Pyramidula solitaria* alive, but their dead shells were common. Perhaps many of these species, as in the Tennessee mountains, are clannish sticklers for locality.

The *P. dorfeuilliana*, *monodon* and *G. demissa* colonize under logs, a pine log sometimes if charred, but the oaks with a rough bark suit them better. The Mesodons were found by digging. In fact nearly all of my new shells were found by quarrying. The first was *Poly. cragini*, described by Call. This I found on my old farm at Thayer, Kansas, while quarrying sandstone in search of fossil plants. Since then I have been a great digger, looking on the well-drained and ventilated rock, dampened only by the soil, as the best locality to find a new species. High up on the mountains is good ground, I have always supposed because it is a poor place for lazy collectors.

This year a Texas friend, who had a team, wagon and canvas cover, went with me from DeKalb, Texas, to Naples, Texas, on one trip, and then to Mena, Arkansas. I walked, and rolled over the rocks and logs, and he good-naturedly drove the team, and at good places stopped the procession and helped gather the shells. In this journey of over 200 miles I do not think I rode over 15, and I do not think he walked that far, except in our side journeys on foot. At night we made a shed of our wagon sheet, and with a roaring pitch-pine fire in front and plenty of blankets, got along nicely through snow and rain, or when the thermometer dropped to zero a few times.

The rivers were high after having been very low, but we could tell by the remains that it was a very rich region in *Unionida* for the seasonable comer. From Naples to the mountains, *P. dorfeuilli-*

ana, *monodon alicia*, *cragini* and *thyroides* were the rule, except on a chalky uplift called Rocky Comfort in Arkansas. Here we found *Helicina orbiculata tropica*, *Bulimulus dealbatus* and *Omphalina friabilis* in the uplands, and *Poly. texasiana* (banded) and *Poly. monodon friersonii* in low land.

Striking the hill country near Horatio, under the first stone outcrop we found *P. albolabris Alleni* and the first *Poly. Binneyana* I had seen alive. Wherever we found a shaded hill-top after that, with an outcrop of rock, we found these shells; and from the number of "bones" scattered about, they must be plentiful on warm spring days. Sometime I hope to get enough for all of my friends. We occasionally found *P. Binneyana* traveling, for there were times a week together when we walked in our shirt sleeves and the frogs and birds were singing.

P. albolabris was found more frequently under logs, but I found only one *binneyana* in that situation. Two *P. albolabris alleni* here usually hibernate together, just under the soil, face upwards. At Hardy I found as many as eight under one log, but the Hardy shell seems to me another variety, or a subdivision of a variety. It is the same as I have found in Kansas, smaller than the *Mena alleni*, more solid and compact, and more perfectly opaque.

From Horatio to Mena it is a clay hill country, and the shells were much the same. At Mena we seemed to strike a truly snail territory. Here the Rich Mountain range is 2,750 feet above sea level, the Fourche and Black Fork ranges were about as high, the Chastats about 2,000 feet, and it was but a little distance to the Magazine Mountain and the Petit Jean range, as high as the Rich Mountains. I found deep, mossy, ferny coves that in the Tennessee mountains would be jeweled with snails. *Gastrodonta demissa brittsi* here was large as *acerra*, and the species were more numerous. It looked altogether more promising. Some day, with an industrious collector, I should like to start from Hardy and never stop until we had gone into the panhandle of Texas. Limestone bluffs and coves are on every hand. There could be new shells every day. With the exception of Simpson's visit to Kiowa, in the Indian nation, and my own trips, the rocks were probably never scratched.

The following is my catch, named with much assistance from Mr. Pilsbry, numbered after the Pilsbry check list:

9a. *Helicina orbiculata tropica* Say. DeKalb, Lanesport, Rocky Comfort, Gilham, Mena.

48. *Vallonia pulchella* (Müll.). Lanesport, one specimen in 1899.

68. *Polygyra leporina* (Gld.). From Mt. Pleasant to Horatio, the animal black as *Z. nitidus* (Müll.), in damp situations, under logs and stones, or feeding about near by; active in winter.

70. *Poly. Dorfeuilliana* Lea. Naples to Mena, sometimes over one hundred in little pockets under logs and stones in well-drained soil. Every lot seemed a little different in color or size, and upon this last trip I collected 1,281. It is abundant in my travels from Arkansas City, Kansas, to Hardy, North Arkansas, to Waco, Texas, and all in between.

70a. *Poly. Dorf. Sampsoni* Weth. Tushkahoma, Ind. Ter., 1899. Fairly plentiful in the rocks.

70b. *Poly. Dorf. percostata* Pils. Poteau, Ind. Ter., 1899. Fairly plentiful on dry mountain side under slabs of sandstone and small logs.

72. *Poly. Jacksoni* Bld. At Poteau in '99. One large specimen found at Mena this year "of the variety with wholly closed axial perforation not uncommon at Fort Gibson."

79. *Poly. Texasiana* (Moric.) Opposite Lanesport in Texas, at Rocky Comfort and Chapel Hill, Ark., next to the water under drift. At Rocky Comfort, banded.

95c. *Poly. Cragini* (Call). Naples, to Mena, under logs in low land, usually. The animal is black and the shell more robust and about one mm. larger than the Kansas type, which is $8\frac{1}{2}$ and 9. The types are a bright, cherry red, these of Ark. nearer the flat corneous brown color of the usual *P. thyroides*.

97. *Poly. inflecta* (Say). Rocky Comfort to Mena.

109a. *Poly. albolabris Alleni* (Wetherby). Horatio to Rich Mountain Station, and at Tushkahoma, I. T. This variety has a thin shell and the color same as *divesta*, glossy. Measures from 28 mm. to 32, and in some cases the umbilicus is partly open.

110. *Poly. exoleta* (Binn.) Mena.

112. *Poly. divesta* (Gld.) A few dead specimens in '99 at Tushkahoma.

112a. *Poly. divesta indianorum* (Pils.) a few dead specimens and young (now alive in my snailery), at Tushkahoma and Poteau in 1899.

112-1. *Poly. Binneyana* (Pils.) a few dead shells and young at Tushkahoma and Poteau in 1899, and one dead at Hardy in drift.

I found it this year from Horatio to Rich Mountain most plentiful in the rocks scattered over the creek bottoms near the city of Mena, in company with *Gastro. demissa Brittsii* and *Poly. hirsuta uncifera*. The measurements were from 23 diam. 11 alt., to 28 mm. diam., 13 alt.; all $5\frac{1}{2}$ whorls. In the Chastat Mountains four miles south I found a smaller variety and got a few alive by digging down a couple of feet. These ran from 16 diam., 8 alt., to 20 diam., 9 alt., with not quite 5 whorls.

124. *Poly. thyroides* (Say). DeKalb to Mena, occasionally, under logs in damp situations. Pilsbry will have much to say on this species, I think, as they run from the *clausa* size to the largest *thyroides*, and were so without regard to locality. The large size were usually found in situations suitable for *multilineata*, while the smaller were about the rocks and under logs upon higher ground.

134-1. *Polygyra Pilsbryi*, n. sp. Shell imperforate, lens shaped, about equally convex above and below, corneous-brown, the surface rather glossy, sculptured above with strong, slightly curved, uneven riblets, running with the growth lines; the riblets on the base very uneven or interrupted as though composed of compressed radial laminae, arranged in several concentric circles. Whorls fully 5, slowly increasing, the last carinated at the periphery, abruptly and shortly deflexed in front. Aperture basal, hook-shaped or like the letter "J" reversed; contracted by a long, arcuate parietal lamella, which extends to the axis and is decidedly curved in, or entering, at its outer end, and is connected with the end of the outer lip by a slight callous ridge. Basal lip reflexed and prostrate, with a rather shallow median notch, much more conspicuous in a front than in a basal view. Alt. 5, diam. 10 mm. Rich Mountain Station (Mt. Mena), Polk Co., Arkansas, on mountain, by roadside leading from R. R. station to the hotel, two specimens (one dead).

Allied to *P. labrosa*, from which it differs in the remarkable sculpture and the form of the basal lip and notch. This shell was picked up by my partner, Mr. Jolly.

At the suggestion of Bryant Walker it is named in honor of Dr. Henry A. Pilsbry, the very one who of late years has given conchologists the most delight, by his enormous zeal and industry, and his untiring exactness. I was instructed by Mr. Walker to find something for the occasion as large as *indianorum* or *Ferrissi*, but this shell has unusual features to make up for the disappointment in

size. It is the best novelty in American shells found, I believe, for some time.

138. *Poly. stenotrema* (Fer.). Found a few on the slope of the Chastat Mountains south of Mena.

139c. *Poly. hirsuta uncifera* (Pils.) n. var. In both the Chastat and Rich Mts. at Mena. From its silvery, clean appearance and unusually prominent basal lip, I believed this to be a new variety, and gathered all I could find. When one is out in the woods, by the way, he cannot always tell what is what.

141a. *Poly. monodon fraterna* (Say). Rocky Comfort on the bank of a creek in company with *friersoni* and *aliciae*.

141b. *Poly. monodon aliciae* (Pils.). Mt. Pleasant and Naples, Texas, to Horatio and Ultima Thule, Ark.

141d. *Poly. monodon friersoni* (Pils.). DeKalb, Texas; Rocky Comfort and Cove, Ark.

141e. *Poly. monodon imperforata* (Pils.), n. var. Rocky Comfort, Mena and Cove. Mr. Pilsbry has thrown a bomb into the monodon-Leai camp, and I merely list these, leaving the description for the article he promises the readers of the NAUTILUS.

153. *Bulimulus dealbatus* (Say). DeKalb, Rocky Comfort, Gilham, Mena.

180. *Strobilops labyrinthica* (Say). Cove, one specimen.

184. *Pupoides marginatus* (Say) [*Leucocheila fallax* of authors]. At Cove under rails in an abandoned field, and at Cerro Gordo under logs; plentiful in company with small red *Poly. thyroides* and *Bifidaria contracta*.

186. *Bifidaria armifera* (Say). DeKalb, Lanesport and Mena.

187. *Bifidaria contracta* (Say). Cove.

247. *Omphalina friabilis* (W. G. B.). DeKalb to Mena, most plentiful at Rocky Comfort.

263. *Vitrea petrophila* (Bld.). Mena. This is the first time this species has been found west of the Mississippi. Three others were also found in this catch that may turn out to be a variety of *V. wheatleyi* (Bld.).

270. *Vitrea indentata* (Say). From Morris' Ferry to Mena.

285. *Vitrea Simpsoni* (Pils.). Morris' Ferry to Mena, both under logs and in the rocks, active.

278-1b. *Conulus chersinus trochulus* Reinh. Cerro Gordo, Hatton's Gap and Chastat Mts., rocks and under logs, rare.

283. *Zonitoides arboreus* (Say). Mt. Pleasant, Texas, to Mena, Ark.

291. *Zon. laeviusculus* (Sterki). One in the Red River bottoms in 1899.

297. *Gastrodonta demissa* (Binn.). Morris Ferry to Mena.

297a. *G. demissa Brittsi* (Pils.). Ultima Thule and Mena. At the latter place in stone piles in the creek bottoms I found a large form. The largest measured 10 mm., and I supposed at the time I had run upon *acerra*.

297b. *G. dem. lamellata* (Pils.). From Morris Ferry to Mena. This was generally found under the logs and very often in company with *demissa*. The largest of both measured about the same, 8 and 9 mm. diameter.

338. *Pyramidula alternata* (Say). From Rocky Comfort to Mena. All rather strongly ribbed and dark in color.

367. *Succinea avara* Say. At Mt. Pleasant, Texas, and Cove, Ark.

As space is valuable in this journal, and my search at these points was far from thorough, I will merely give a list of species found at Hardy and Little Rock, Ark., and Dennison, Texas, not included in the above. Hardy is a particularly good locality, as there is a wide range of species. I found *Vitrea simpsoni* here on my last trip, the most northern and eastern limit so far recorded.

119c. *Polygyra appressa* (Say). At Hardy a highly sculptured variety with small denticle upon the upper lip. This variety is known as Say's "variety A." It measures from 18 to 20 mm. diameter.

119d. *Poly. appressa perigrapta* (Pils.), typical. Little Rock. I also have this from extreme northwestern Arkansas.

120. *Poly. elevata* (Say). Hardy.

125. *Poly. clausa* (Say). Hardy.

134. *Poly. labrosa* (Bld.). Little Rock.

190. *Bifidaria procera* (Gld.). At Hardy in '99.

198. *Bi. curvidens* (Gld.). At Hardy in '99.

199. *Bi. pentodon* (Say). At Hardy in '99.

278-1a. *Conulus fulvus dentatus* (Sterki). At Hardy in '99.

338c. *Pyramidula alternata rarinotata* (Pils.). At Dennison, Texas.

239. *Circinaria concava* (Say). Hardy and Little Rock.

340. *Pyramidula solitaria* (Say). Hardy.

342. *Pyr. perspectiva* (Say). Hardy.

346. *Helicodiscus lineatus* (Say). Hardy.

NOTICES OF SOME NEW JAPANESE MOLLUSKS.

BY H. A. PILSBRY.

[Continued from May No., p. 12.]

***Buliminus Hirasei* n. sp.**

Shell rimate, cylindric-conic, rather solid, whitish-corneous or pale reddish corneous, with opaque white streaks and lines. Surface irregularly striatulate and very finely though rather irregularly spirally striate. Spire with quite convex outlines, a trifle attenuated near the obtuse apex. Whorls 8, the first slightly convex, following whorls *almost flat*, the last one more convex. Aperture but slightly oblique, pale reddish-brown within, ovate; peristome white, expanded, thickened within; columella simply concave, without a fold; parietal callus very thin in the middle, thickened toward the ends, having a low tubercle near the posterior angle.

Length 19, diam. 9, of last whorl above aperture 8; length of aperture 83 mm.

Length 19, diam. 8, of last whorl above aperture 7.5; length of aperture 7.6 mm.

Kikai, Prov. Osumi, Japan (Y. Hirase).

This species differs from *B. reinianus* Kob. and *andersonianus* Mlldff., in the obese form and especially the light coloration. It is much smaller and especially shorter than *B. japonicus* Mlldff., which was described from a single beached specimen. *B. japonicus* while decidedly larger, alt. 28, diam. 11 mm., the aperture 11 mm. long, has a half whorl less ($7\frac{1}{2}$), and no mention is made by Dr. v. Mölendorff of a tubercle near the posterior angle of the peristome, such as occurs in *B. Hirasei*.

It is named in honor of Mr. Y. Hirase, of Kyoto.

***Buliminus extorris* var. *omiensis* n.**

Shell rimate, resembling *B. cantori* in general form, large, solid and dark chestnut brown; irregularly striate, the striae more or less cut into granules by very irregular spirals. Spire with convex outlines below, straight above, the last two whorls of about equal diameter; apex obtuse. Whorls $8\frac{1}{2}$, convex, the last rather compressed. White, somewhat thickened within, the ends connected by a white cord across the parietal wall, thickened into a slight tubercle near the posterior angle. Columella concave below, having a short strong fold above.

Length 29, diam. 10, length of aperture 10.3, width 8.3 mm.

Length 29.5, diam. 10, length of aperture 11, width 7.8 mm.

Ibuki, prov. Omi, Japan (Y. Hirase).

I refer this form with some doubt to *B. extorris* Brancsik (Jahresheft Nat. Ver. Trencsiner Comitatus, 1891, p. 81, pl. 7, f. 3), described as probably from Japan; but that species has a narrower aperture very like that of *B. cantori*, and is a more slender shell than this one, with the aperture and diameter less than one-third the length of the shell, while in var. *omiensis* these measurements exceed one-third. *B. e. omiensis* is a narrower shell than *B. japonicus*, with an additional whorl and folded columella. The peristome and parietal callus are more developed than in *B. reinianus*.

***Buliminus callistoderma*, n. sp.**

Shell rimate, thin, *conic*, somewhat translucent, of a brownish olive color; somewhat glossy, *densely granulose* in spiral series. Spire rather straightly conic; apex obtuse. Whorls $5\frac{3}{4}$, convex, the last a little ascending in front, swollen, convex beneath. Aperture irregularly ovate; *peristome thin*, expanded; columellar margin dilated, reflexed above; parietal callus a mere translucent film, not tuberculate or thickened near the posterior angle.

Length 10, diam. 5.5, length of aperture 4.9 mm.

Ogasawara Shima (Bonin I.), Japan (Y. Hirase).

Quite unlike other Japanese or Loo Choo species in its short, conic form, the small number of whorls, thin shell, and densely granulose surface.

(To be continued.)

SUPPLEMENTAL NOTE ON PLANORBIS CORPULENTUS SAY.

BY BRYANT WALKER.

Dr. E. W. Hubbard, of Elyria, Ohio, whose catalogue of shells of that State was published at an early date, and who there cites *P. corpulentus* as one of the species represented in his collection, was a grandfather of Mr. George H. Clapp, of Pittsburg, Pa. Mr. Clapp has kindly sent to me for examination two sets of *Planorbis* from Dr. Hubbard's collection, labeled *P. corpulentus*, one from Elyria, the other without locality. Both are *P. trivolvis* and do not differ from that species as usually found. This unexpected verification of the

misconception of Say's species, entertained by the early collectors, is both interesting and valuable.

My attention has been also recently called to the fact that Tryon first formally differentiated the west coast form from *P. corpulentus* as *P. binneyi*, in his review of Binney's "Land and Fresh-Water Shells," Part II, in the Am. Jour. of Conch., III, p. 197 (1867). This citation should, therefore, be added to the bibliography appended to my article in the April NAUTILUS.

The following typographical errors in that article should also be corrected:

In foot-note on page 134 delete the words "part of." Also for "Say," in lines one and three, read "Jay."

On page 136, in the quotation from Mr. Whiteaves' letter, for "five" read "fine."

PUBLICATIONS RECEIVED.

SYNOPSIS OF THE AMERICAN SPECIES OF THE FAMILY DIPLODONTIDÆ. By W. H. Dall (Extracted from the Jour. of Conch. Vol. IX. pp. 244-246, Oct. 1899). Dr. Dall says: "The family Diplodontidæ comprises the genera *Felania*, *Diplodonta*, *Ungulina* and *Joannisiella*. The Cryptodontidæ which have been by some authors united with this group, possess very remarkable anatomical characters, and should be kept separate. *Joannisiella* has long been confounded with *Cyrenoides*, from which much misconception has arisen. The former is a brackish water Diplodonta with a flattened foot, the latter belongs to a distinct group. The typical *Felania* is close to *Diplodonta*, but many Lucinoid shells have been mistakenly referred to *Felania*.

East American Species.

Diplodonta punctata Say (*Amphidesma*). Syn. *D. venezuelensis* Dkr. *D. janeirensis* Rve., *D. subglobosa* C. B. Ads. *D. braziliensis* Mitre, *D. orbella* Gabb, *Mysia pellucida* Heilp. Cape Hatteras to South Brazil.

Diplodonta nucleiformis Wagner. Syn. *D. elevata* Conr., *D. carolinense* Conr. Coast of the Carolinas, 15-52 fathoms; fossil in the Miocene of Virginia and N. Carolina.

Section *Felaniella* Dall, 1899.

Diplodonta candeana Orb. Marco, Florida, to Brazil.

Diplodonta vilardeboana Orb. Brazil and Argentine coasts.

Section *Phyciderma* Dall, 1899.

Diplodonta soror C. B. Ads. Jamaica, north to the Florida Keys and Texas; fossil in the Miocene of Virginia and N. Carolina.

Diplodonta semiaspera Phil. Syn. *D. granulosa* C. B. Ads., *L. semireticulata* Orb. Cape Hatteras to Rio Janeiro, Brazil; fossil in the Pliocene of Florida.

Diplodonta puncturella Dall, n. sp. Jamaica; fossil in the Oligocene, Bowden, Jamaica.

Diplodonta platensis Dall n. sp. In 11 fathoms off Rio de la Plata.

Section *Sphærella* Conrad.

Diplodonta verrilli Dall, = *D. turgida* V. & S., 1881, not Contr. 1848. Martha's Vineyard, Mass., to N. Carolina, in 15-69 fathoms.

West American Species.

Diplodonta orbellu Gould. (*Sphaerella tumida* Contr. Ms.) British Columbia to Lower California.

Diplodonta tellinoides Reeve. Panama to Guayaquil.

Diplodonta discrepans Cpr. Mazatlan.

Diplodonta subquadrata Cpr. Not *D. subquadrata* Gabb, but perhaps *D. undata* Cpr. Cape St. Lucas to Acapulco and Mazatlan.

Section *Felaniella* Dall.

Diplodonta obliqua Phil. (*Lucina calculus* Reeve). Cape St. Lucas, Mazatlan.

Diplodonta cornea Reeve. Gulf of Nicoya.

Diplodonta sericata Reeve. *Felania sericata* Cpr. Gulf of California.

Diplodonta nitens Reeve. Gulf of Guayaquil.

Section *Phlyctiderma* Dall.

Diplodonta cælata Reeve. Bay of Guayaquil.

Diplodonta semirugosa Dall, n. n. = *D. semiaspera* Cpr. not Philippi. Gulf of California.

DIE CONCHYLIIEN DER PATAGONISCHEN FORMATION. By H. von Ihering. (Neues Jahrbuch für Mineralogie, Geol. und Palæon. Bd. II, pp. 1-46, taf. I, II, 1899.) There are recorded from this formation 69 species. 9 new species are described, followed by general observations on the formation and fauna.

LAND AND FRESHWATER MOLLUSCA OF INDIA, Vol. II., pt. 9. By Lieut.-Col. H. H. Godwin-Austen. The part now before us continues the account of the *Zonitidæ*, a large part of both text and plates relating to the soft anatomy of the various forms. The groups *Macrochlamys*, *Eurychlamys* (n. s.-g.), *Ratnadvipia* (n. s.-g.), *Euplecta*, *Girasia*, *Austenia*, *Microcystina*, *Microcystis*, *Mariella*, *Bensoniella*, *Haughtonia* (n. s.-g.), *Nilgira*, *Ariophanta*, *Khasiella* (n. s.-g.) are treated in more or less detail.

In so large an amount of new and interesting information, only a few points can be specially mentioned.

In *Macrochlamys pedina* the spermatheca was found to contain not less than seven spermatophores; and the morphology of the

spermatophore in various Indian genera is discussed at some length. The value of this organ in classification is stated to be not inconsiderable, as it is subject to modification probably generic in constancy. In *Euplecta semidecussata* the vagina (or free oviduct) is swollen above its union with the spermatheca duct, the author interpreting this structure as a provision for retaining the ova, and terming it the "ovitheca."¹ In treating of *Mariælla*, Godwin-Austen adopts Cockerell's suggestion that the *M. dussumieri* was from Mahé on the southwest coast of Peninsular India, not Mahé, one of the Seychelles. The genus is shown to be closely allied to *Girasia*.

By restricting several parts of his work to Zonitid anatomy, a quantity of data invaluable to other workers in this difficult group has been amassed, although, as Godwin-Austen modestly points out, the time for definite classification of the whole group has not yet arrived.—H. A. P.

GENERAL NOTES.

AGE OF DEPOSIT UNDERLYING LOS ANGELES, CAL.—The discovery of the remains of a species of *Radiolites*, *R. Hamlini* Stearns, in the Third Street Tunnel clays in the city of Los Angeles, of which we have been informed, is of exceeding interest through its bearing on the question of the geologic age of the region, which has been in doubt (*Cf.* NAUTILUS, June, 1900, p. 15). The *Radiolites* is a Cretaceous form and not heretofore reported from the west coast.

ERRATA.—For "vertical" in the sixth line of the second paragraph, page 3 of the May number, read "ventral." In the next paragraph, fourth line, after the word ligaments, read "is" instead of "are."

LISTS OF RECENT MOLLUSCA.—Messrs Sowerby & Fulton have issued a series of lists of recent mollusks, enumerating a large number (11,300) of the known species of most of the genera, classified according to late authorities. They are well and accurately printed, and collectors will find them useful and interesting.

TO A SLUG. (IN ALCOHOL.)

Hail, Limax!—clammy, slimy thing,
 Poor houseless wretch, of thee I sing!
 Though ended is thy earthly run,
 Thy glory is but yet begun.
 For Science, with obtrusive pride,
 Will keep intact thy mortal hide
 And suffer thee, for future gain,
 In best of spirits to remain.

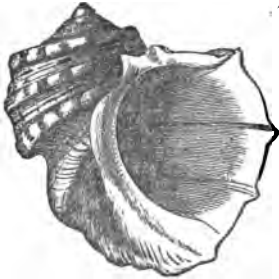
Oakland, Cal., Apr. 15, 1900.

H. H. BRUENN.

¹ Perhaps "oötheca" would be better, ovitheca being a hybrid word.

BIG SHELLS AND LITTLE.

Among the things which we are now putting in stock are some of the largest living shells. There are rather limited numbers of extra large and attractive



specimens of *Turbo marmoratus* (fig.), *Melo didema*, *Hippopus maculatus* *Trochus niloticus*, *Triton tritonis*, *Megalatractus* [*Fusus*] *proboscidiferus*, *Tridacna gigas*, *Cassis cornuta*, and *Pterocera bryonia*, as well as many other forms of gradually diminishing size. At the other end of the scale, with several thousand species in between, come some of the tiniest and most exquisite little shells known, such as *Umbonium vestiarium*, *Neritina viridis*, *Rissoa cimez*, *Trivia quadri-punctata*, *Atlanta*, *Ringicula*, *Gena*, *Gemma*, etc. The big shells for the crowning glory of your cabinets, the tiny ones for the marvel and astonishment of your friends, both as witnesses of

Nature's wonderful handiwork!

Prices on the large shells will be quoted (at lowest possible figure) on individual specimens, according to size; the small ones are included in our full Catalogue of Mollusca (170 pp., 20 cuts, by mail, 40 cents, postpaid). Write to us; it is worth the postage.

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Vol. XIV.

NOVEMBER, 1900.

No. 7

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THE NAUTILUS.

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LAND SNAILS OF CAPE MAY, NEW JERSEY.

BY HENRY A. PILSBRY.

The littoral of Southern New Jersey is perhaps as unpromising collecting ground for the land shell hunter as can be found in the Eastern States. The general physical features of the region are well known, now that the whole coast has become a great summer playground; but it may be said that the land snails are nearly or entirely confined to the occasional patches and strips of cedar scrub on the islands and along the shore, usually within a couple of hundred yards of the beach, and often separated from it by a narrow strip of shifting sand dunes. Between these littoral cedar groves and the mainland proper, wide stretches of salt marsh intervene, intersected by inlets, and inhabited by myriads of *Melampus lineatus*, *Litorina irrorata* and *Modiola plicatula*.

Such situations occur at frequent intervals from Atlantic City to Cape May. At the latter place the salt marshes are reduced to a minimum; but in common with the more northern localities, the shore strip is insulated, so far as the land snail fauna is concerned, by the pine belt of the interior. There are, however, many deciduous trees and a rich soil at Cape May, while at the more northern localities the deciduous trees are wanting, except where imported, and the dark soil is a mere film over nearly pure sand.

The snails are everywhere, so far as my own experience goes, confined to the cedar groves. At Cape May Point there is a dense growth of cedar, oak, dwarf plum, bay, with more or less holly and prickly pears. It need not be mentioned to a New Jersey naturalist

that in these choice retreats mosquitoes are abundant. The New Jersey mosquito, like Napoleon's famous Old Guard, dies, but never surrenders. You wipe him off, and the gore flows freely. Here were found *Polygyra albolabris maritima*, *Bifidaria hordeacella*, *B. pentodon*, *Vertigo milium*, *Zonitoides arboreus*, *Agriolimax campestris* and *Succinea campestris vagans*. Only one specimen each of the *Zonitoides* and *Agriolimax* were found. An additional species, *Zonitoides minusculus*, occurred a few miles further northwest.

In Cape May city, on mounds around the tanks at the gas works at 703 Lafayette street, I found *Vallonia pulchella* and *Pupoides marginatus* quite abundant. These may possibly be imported species, as nothing of them was seen except in the old and long settled part of town.

The most remarkable records are *Bifidaria hordeacella*, a species of the Gulf States, hitherto not known north of the Georgia Sea Islands, and the very distinct variety of *Succinea*, which may be defined thus :

***Succinea campestris vagans*, n. v.**

Shell similar to *S. campestris* in the wrinkled surface and very convex last whorl, but smaller, with only $2\frac{3}{8}$ whorls in fully mature specimens, the aperture shorter and less ovate, and the color a rather pale olive-green, translucent, with scarcely any whitish layer within ; surface rather dull.

Length 9, diam. 6.5, longest axis of aperture 6.2 mm.

Length 7.6, diam. 5.6, longest axis of aperture 5.4 mm.

Cape May Point, N. J. (H. A. P., August, 1898.) Types No. 78,882, coll. A. N. S.

I cannot refer the specimens to any Northern species. They are nearer *S. campestris*, which extends from the Georgia coast, throughout Florida, and west to the mouth of the Mississippi, the western specimens being the thin, smooth and glossy variety *unicolor* of Tryon.

Some years ago, Mr. W. B. Marshall reported *Succinea avara* from Cape May. "The exact locality was on the ocean front at 8th avenue, Mt. Vernon, between Cape May City and Cape May Point, and was not more than 200 feet from the line of high tide."¹ Some of these specimens are now before me, and seem referable to *S. aurea* Lea rather than to *avara*; though it must be acknowledged that the

¹ NAUTILUS, VI, p. 19, June, 1892.

determination of *Succineas* is often far from certain. Similar shells were sent by Mr. C. Le Roy Wheeler, also from Cape May, exact locality not given.

My collection was made in August, 1898.

MOLLUSCA OF SOUTHERN KENTUCKY.¹

BY SADIE F. PRICE.

While engaged in botanical work, I have collected the following land and fresh-water shells, most of them in Warren county :

Polygyra plicata Say.

Polygyra divesta Gld. Scarce. Probably the first time this species has been listed so far east or north. Bowling Green.

Polygyra troostiana Lea.

Polygyra monodon Rack.

Polygyra palliata Say. Warren, Barren and Edmonson counties, and East Kentucky at Burnside.

Polygyra appressa Say. Common, Warren and Edmonson counties.

Polygyra inflecta Say. Common, Warren, Barren and Edmonson counties.

Polygyra rugeli Shuttl. Bowling Green.

Polygyra tridentata Say. Common, Warren, Edmonson and Barren counties.

Polygyra obstricta Say. Not common. Under rotten logs. Warren and Barren counties.

Polygyra albolabris Say. Warren, Barren and Edmonson counties.

Polygyra elevata Say. Common throughout South Kentucky.

Polygyra exoleta Binn. Very common.

Polygyra clausa Say.

Polygyra thyroides Say. Very abundant.

Polygyra thyroides bucculentus Gld. Bowling Green.

Polygyra downieana Bld. Rare. Warren and Edmonson counties.

Polygyra profunda Say. Scarce. Edmonson county.

Polygyra stenotrema Fér.

¹ I am indebted to Mr. C. T. Simpson, National Museum, for naming doubtful Unios.

Vallonia pulchella Mull. Rather common. Bowling Green.

Pyramidula perepectiva Say. Rather common throughout Southern Kentucky. Also found at Torrent, East Kentucky Mountain.

Pyramidula bryanti Harper. Only one specimen found. This Mr. Simpson says is considerably out of its usual range.

Pyramidula alternata Say. Barren, Edmonson and Warren counties, East Kentucky in the mountains.

Pyramidula alternata carinata Pils. Rather common. Bowling Green.

Pyramidula alternata mordax Binney. Not common. Bowling Green.

Strobila labyrinthica Say. Bowling Green.

Pupoides marginatus Say.

Bifidaria contracta Say.

Bifidaria armifera Say.

Bifidaria procera Gould.

Circinaria concava Say. Bowling Green, Brownsville.

Vitrea indentata Say. Warren county.

Zonitoides arboreus Say. Warren county.

Vitrea sculptilis Bld.

Omphalina laevigata Pfr. Warren and Edmonson counties.

Gastrodonta ligera Say. Throughout southern Kentucky.

Gastrodonta acerra Lewis. Barren county.

Gastrodonta demissa Binn. Common.

Gastrodonta interna Say. Southern Kentucky and in the mountains of East Kentucky.

Bulimulus dealbatus Say. Common on rocky hillsides. Bowling Green.

Succinea avara Say.

Succinea ovalis Gld.

Succinea totteniana Lea (?). On ferns in sink-hole. Bowling Green.

Heliodiscus lineatus Say. Bowling Green.

Helicina orbiculata Say.

Limnæa humilis Say. Near Green and Barren rivers, under damp moss.

Planorbis bicarinatus Say. Rather common.

Planorbis trivolvis Say. In ponds. Common.

Planorbis parvus Say. On rocks in pounds.

- Ancylus rivularis* Say. In ponds and rivers.
- Physa gyrina* Say. In springs and creeks throughout southern Kentucky and at Lexington.
- Physa pomilia* Con. In ponds. Not uncommon.
- Physa heterostropha* Say. Barren River.
- Physa heterostropha*, var. Creeks.
- Campeloma obesum* Lewis (?). Barren River.
- Campeloma integrum* Say. Barren River.
- Campeloma ponderosum* Say. Common.
- Lioplax subcarinata* Say.
- Pomatiopsis lapidaria* Say. Bank of Barren River.
- Pleurocera filum* Lea. Very common.
- Pleurocera sycamorens* Lea.
- Pleurocera undulatum* Say.
- Lithasia planispira* Anthony.
- Lithasia nuclea* Lea.
- Lithasia undosa* Anth.
- Lithasia obovata* Say.
- Goniobasis curvilabris* Anth.
- Goniobasis curvilabris*, var. Rather common.
- Goniobasis abbreviata* Lea.
- Goniobasis curreyana* Lea. Common.
- Goniobasis costifera* Hald. Green and Barren Rivers.
- Goniobasis costifera*, var.
- Goniobasis vicina* Anth. Warren county.
- Goniobasis athleta* Anth. Barren county.
- Goniobasis depygis* Say.
- Goniobasis nassula* Con. var. Indian Creek.
- Goniobasis infantulum* Lea.
- Goniobasis saffordii* Lea. Indian Creek.
- Goniobasis edgariana* Lea. Creeks.
- Goniobasis elegantula* Anth. Barren River.
- Goniobasis paupercula* Lea.

UNIONIDÆ.

- Quadrula undulata* Barnes. Common in all streams.
- Quadrula trigona* Lea. Common.
- Quadrula rubiginosa* Lea.
- Quadrula pyramidata* Lea.

- Quadrula coccinea* Con.
Quadrula pustulosa Lea. Very common.
Quadrula obliqua Lam.
Quadrula verrucosa Barnes.
Quadrula globata Lea.
Quadrula lachrymosa Lea.
Quadrula plicata Say.
Quadrula cooperiana Lea.
Quadrula heros Say. Barren county.
Quadrula metanerva Raf.
Quadrula cylindrica Say,
Quadrula solida Lea.
Plagiola elegans Lea.
Plagiola securis Lea.
Plagiola donaciformis Lea.
Lampsilis ventricosus Bar. Barren River.
Lampsilis multiradiatus Lea.
Lampsilis ligamentinus Lam. Very common.
Lampsilis ligamentinus Lam. var.
Lampsilis gracilis Barnes.
Lampsilis anodontoides Lea. Ohio, Green and Barren Rivers.
Lampsilis rectus Lam.
Lampsilis cumberlandicus Lea.
Lampsilis luteolus Lam. *L. lienosus* Con.
Lampsilis texasensis Lea.
Lampsilis ovatus Say. *L. obscurus* Lea.
Lampsilis regularis Lea.
Lampsilis alatus Lea. Common.
Lampsilis iris Lea. *Lampsilis perdix* Lea.
Lampsilis subrostratus Say.
Lampsilis planicostatus Lea.
Lampsilis parvus Barnes.
Lampsilis caliginosus Con.
Lampsilis vanuxumensis Lea.
Lampsilis nigerrimus Lea.
Lampsilis fatuus Lea.
Unio grandiferus Lea. Rather common.
Unio gibbosus Barnes. Both the purple and salmon-colored forms
 are found in all streams.

- Obliquaria reflexa* Raf. Common.
Obliquaria lens Lea.
Ptychobranhus phaseolus Hild.
Strophitus edentulus Say.
Truncilla perplexa Lea.
Truncilla perplexa rangiana Lea.
Truncilla triquetra Raf.
Pleurobema clara Lam.
Pleurobema asopus Green.
Pleurobema edgariana Lea.
Obovaria circulus Lea.
Tritogonia verrucosa Raf. *U. tuberculatus* Barnes.
Cyprogenia irrorata Lea. Common.
Micromya lapillus Lea.
Alasmodonta rugosa Barnes. Common.
Alasmodonta deltoidea Lea.
Alasmodonta minor Lea. Gasper River.
Alasmodonta truncata (Say) Wright.
Anadontoides ferussacianus Lea.
Anodonta imbecilis Say. Rivers and ponds near rivers.
Anodonta grandis Lea.
Anodonta grandis gigantea Lea.
Sphærium sulcatum Lam.
Sphærium fabale Prime. River and creeks.
Calyculina partumeia Say.
Calyculina transversa Say.
Pisidium virginicum Gm. Rivers and ponds.
Pisidium peraltum Sterki. Ponds.

NEW SPECIES OF JAPANESE LAND MOLLUSCA.

BY H. A. PILSBRY.

Eulota (*Plectotropis*) *kiusiuensis* n. sp.

Shell openly umbilicate, depressed, acutely carinate, light yellowish brown, slightly shining. Surface densely but lightly striate spirally, under a thin cuticle which bears rather wide-spaced, irregularly developed lamellæ ending in short shreds at the periphery, the

lamellæ frequently interrupted on the base. Spire very low-conic; whorls barely 6, slightly convex, slowly increasing, the last a little pinched above and below the peripheral keel. Base much more convex than the spire, flattened and sloping below the keel, swollen towards the middle, obtusely angular around the conic umbilicus. Aperture oblique, irregularly squarish, the peristome white, somewhat thickened within, angular at the terminations of the peripheral and umbilical carinæ, the upper margin hardly expanded, basal margin expanded, somewhat reflexed, columellar margin a little dilated.

Alt. 8.5, diam. 17.5 mm.

Alt. 8.5, diam. 17 mm.

Kikai, Osumi, in southern Kiusiu (Mr. Y. Hirase).

This species is closely related to *E. trochula* (A. Ad.), known only from Tsusima, differing from that species in the much more angular aperture, far flatter spire and more convex base.

Trishoplita goodwini var. *suprazonata* n. var.

Shell similar in form to *T. goodwini*, but with apex obtuse; thin, somewhat translucent, corneous-brown, paler around the umbilicus, and with a wide white zone bordering the suture, ascending the spire. Whorls $5\frac{1}{2}$. Alt. 9.5, diam. 13.5 mm.

Ushirokawa, Tosa, Shikoku Island (Mr. Y. Hirase).

A smaller form, alt. 8.5, diam. 11.5 mm., occurs at Kagoshima, Satsuma, in southern Kiusiu. This variety is more conic than the variety *fusca* of Gude, which is moreover smaller and without the whitish band above.

Kaliella symmetrica n. sp.

Shell minutely perforate, turreted-pyramidal, the spire with convex lateral outlines and blunt, rounded apex; yellowish-corneous; sharply striated above with excessively fine, densely crowded longitudinal striæ, which give it the luster of silk, the base glossy, showing faint, spaced spiral lines under a high magnification. Whorls $5\frac{1}{2}$, very convex, the last obsoletely subangular at the periphery, moderately convex beneath, impressed around the perforation. Aperture basal, rather narrow, curved, shaped like the middle third of a crescent with the ends cut off; outer and basal margins of the peristome acute and simple, the columella vertical, its edge triangularly reflexed. Alt. 2.1, diam. 2 mm.

Kashima, Harima (Mr. Y. Hirase).

This species somewhat resembles *Hyalina pustulina* Reinhardt, but it is proportionately higher, smaller, the last whorl less enlarged, the spire being more prominent; consequently the aperture is smaller. I would consider this shell an *Euconulus* were it not so closely allied to the following species, which I do not doubt is a *Kaliella*. Half-grown specimens are still only obtusely angular at the periphery.

***Kaliella fraterna* n. sp.**

Shell similar to *K. symmetrica*, except that it has an acute, projecting, thread-like peripheral keel, like that of *K. labilis* (Gld.), extending undiminished to the aperture.

Kashima, Harima, with *K. symmetrica* (Mr. Y. Hirase).

***Euconulus Reinhardtii* n. sp.**

Shell globose-conic, perforate, fragile, pale corneous yellow; glossy, with sparse rather conspicuous oblique growth-wrinkles and extremely fine subobsolete, crowded spiral striæ. Spire elevated, the apex rather acute. Whorls $5\frac{1}{2}$, quite convex, separated by deeply impressed sutures, the last whorl large, subglobose, rounded at the periphery, but showing the almost obsolete trace of a peripheral angle; base strongly convex, slightly impressed around the narrowly perforate axis. Aperture somewhat oblique, roundly lunate, the peristome thin, very fragile, simple, the columellar margin rather broadly dilated above. Alt. 3.9, diam. 3.7 mm.

Kashima, Harima (Mr. Y. Hirase).

A globose-conic species which I first thought to identify with *H. pupula* Gould; but it differs from that insufficiently defined species in the rounded last whorl and various other characters.

It has been shown that the name *Conulus* is preoccupied in Mollusca by Rafinesque, who proposed that name for the genus *Conus*. This will prevent its use for the common *Helix fulva* of Müller, and various European authors have now abandoned *Conulus* in favor of *Arnouldia* of Bourguignat. It has apparently escaped the notice of these gentlemen that *Euconulus* of Reinhardt was proposed for the *fulvus* group some seven years before Bourguignat's publication. The genus will therefore stand thus:

EUCONULUS Reinh.

Conulus Fitz., 1833, not of Rafinesque, 1814.

Euconulus Reinhardt, Sitzungs-berichte Ges. naturforsch. Freunde zu Berlin, 1883, p. 86 (*E. fulvus* and *praticola*).

Arnouldia Bgt., Bull. Soc. Mal. France, VII, 1890, p. 328.

It is doubtful whether any Japanese species really belong to *Euconulus*. Most of them have all the shell characters of *Kaliella*, a genus abundantly developed in India, China and indeed the whole Orient. Reinhardt's Japanese "*Trochoconulus*" I refer to *Kaliella*. His "*Discoconulus*," judging from *sinapidium*, the only species I have seen, might belong to *Vitrea*. *Arnouldia nahaënsis* of Gude is a *Kaliella*.

Punctum japonicum n. sp.

Shell minute, openly and rather widely umbilicate, depressed, thin, light brown. Spire convex, low; whorls $3\frac{1}{2}$, quite convex, separated by deeply impressed sutures, regularly and rather slowly increasing; last whorl tubular, rounded at the periphery. Sculpture of delicate spaced, irregular lamellar riblets, the intervals sharply finely striated, and with close spiral striæ. Width of the umbilicus is contained about $3\frac{1}{3}$ times in the diameter of the shell, all the whorls readily visible within it. Aperture rounded-lunate, oblique, the peristome simple and acute.

Alt. 0.7, diam. 1.25, width of umbilicus 0.37 mm.

Kashima, Harima (Mr. Y. Hirase).

The only other known Japanese species of *Punctum* is "*Helix* (*Patula*) *lepta*" of Westerlund, described from Nagasaki. It has a much narrower umbilicus than *P. japonicum*, the last whorl is subangular above, and it is described as with dense riblets.

NEW RECORDS OF NEW MEXICAN SNAILS.

BY H. A. PILSBRY.

August 25th last, Professor T. D. A. Cockerell collected a few snails "in Chicorico Cañon, near Raton, New Mexico. This is in the region of *Quercus gambeli* and *Robinia neomexicana*, at an elevation of about 7000 ft. There are no previous records of mollusca from this region. It is quite in the northern part of the State, only a few miles from the Colorado boundary." The species are:

Vallonia gracilicosta Reinh.

Vitrina pfeifferi Newc.

Euconulus fulvus (Müll.).

Zonitoides arboreus (Say).

Bifidaria pilsbryana Sterki. A form with the crest more developed than in the type, and the palatal folds standing upon a callous ridge.

In this connection I may mention that a specimen of *Bifidaria hulzingeri* (Sterki) has been found among minutæ collected by Prof. Cockerell at Mesilla, N. M., in drift of the Rio Grande. So far as I know, this species has not been reported before from west or south-west of Wichita, Kansas.

Ashmunella chiricahuana (Dall) has been collected by Prof. E. O. Wootton in a pine region on the west fork of Gila River, near Mogollon Peak, N. M.

DESCRIPTION OF NEW SPECIES OF ASIATIC SHELLS.

BY C. F. ANCEY.

Euhadra (?) *pseudocampylæa* Anc.

Testa convexo-depressiuscula, omnino tecte perforata, nitidiuscula, parim solidula, sub epidermide tenui fusco lutea sordide albescens vel pallide brunnea, lineolis incrementi subtus magis conspicuis obsolete notata. Spira convexa, parum elevata, obtusissima. Anfractus $5\frac{1}{2}$ convexi, sutura impressa separati, sat lente et regulariter crescentes, ultimus supra prope aperturam leviter malleatus, antice leniter descendens, dein ad peristoma paululum ascendens, supra convexus, ad peripheriam rotundatus, basi convexo-depressus, in umbilici loco profunde impressus pone aperturam breviter constrictus. Apertura transverse suboblunga, lunata, obliqua, marginibus distantibus, callo, tenui junctis, extero regulariter arcuato, basali subdeclivi. Peristoma album, incrassatum, breviter expansum, ad basin et columellam præcipue reflexum, angustum, supra perforationem prorsus clausam dilatatum.

Diam. max. 30, min. $25\frac{1}{2}$, alt. 17 mill.

Hab.: Tâtsien-loû, ad limites Thibeti et provinciæ sinensis Sse-tchuen (Comm. Cl. Abbé Mège).

This is a very distinct species, and at once recalls to mind a large and more globose *Helicigona pyrenaica* with a closed umbilicus. It is provisionally referred to *Euhadra*, but the generic position is difficult to ascertain. A single dead example was obtained, and is in my collection. With this I received a fine example of the very rare *Helicarion Böttgeri*, Hilber, of which the Austrian expedition of

Szechenyi obtained a single specimen. These shells were detected by French missionaries, and the locality, although furnishing several species of mollusca, is not a rich one as far as shells are concerned.

Planorbis persicus Anc.

Testa compressa, non carinata, olivaceo vel subgriseo-cornea, oblique confertim striata, nitidula, pro genere relative solidiuscula, utrinque lateumbilicata et concava, discoidea. Spira apice minute immerso. Anfractus 5, convexi, sutura impressa, sat lente crescentes; ultimus supra convexo-declivis, post medium rotundato-subangulatus, infra depressus. Aperture obliqua, transverse oblonga, sublunata, intus obscure albo-labiata (in peradultis), marginibus callo appresso junctis. Diam. mag. 9. min. $7\frac{1}{2}$, alt. $2\frac{3}{8}$ mill.

Hab.—Téhéran, prov. Trak-ajemi, Persia; Salmas, north of Lake Urmiah, Persia (Comm. G. Nægele).

This is allied to, but different from, *Pl. subangulatus* Phil., from which it is easily distinguished in being much less distinctly angled below the periphery. The above description is drawn from the largest specimen sent me by Herr G. Nægele; some also probably mature are much smaller and more rounded.

Physa Moussoni Ancey.

Physa lirata, Mousson in Journ Conch., 1874, p. 43, non Tristram (1863), nec Craven (1880).

The name *Physa lirata* having been used several times, I should call attention to the fact that Dr. Rudolf Sturany (Catalog der Sudafrik. Land- und Süsswasser-Moll., 1898, p. 76), not being aware that several years ago I proposed to substitute *Physa Craveni* for *lirata* Craven (not of Tristram), calls the latter *Craveni* Sturany, while I should claim for the priority of *Craveni*, Ancey; but this induces me also to change *lirata* Mousson to *Moussoni* Ancey, as the specific name *lirata* must be retained for the species originally described from Madagascar.

Ph. Moussoni Ancey was discovered in Mesopotamia by Dr. Schaeffli.

Helicina Sundana Ancey, nom. nov.

The above name I suggest for *Helicina exserta* Martens, a species occurring in the islands of Saleyer, Kalao and Jampea, between Celebes and Flores, as another *Helicina* from Cuba has long ago been described under the same name of *exserta*, "Gundlach, MSS.," by L. Pfeiffer (see Malak Blätter, v, 1858, p. 194).

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